SECTION II

RECOMMENDATIONS

DEMOGRAPHIC CHARACTERISTICS

There does not exist, at present, reliable information regarding land use in urban areas in the United States which is developed from a consistent set of assumptions and definitions. This information is vital to assessments such as this one which are based on control costs per acre of "urban" land. A comprehensive and meticulous data gathering effort is needed to provide the improved information base on land use.

Significant gaps exist in available information on population and area served by type of sewerage system. More refined estimates are needed for combined sewer systems. First estimates need to be made of storm sewered and unsewered areas. Also, the number of overflow points needs to be inventoried. This effort would need to include an unambiguous way to distinguish "drainage channels" from "receiving waters." Given some standardized definition of terms, much valuable information could be obtained from current USEPA 208 planning studies.

RUNOFF AND QUALITY PREDICTION

Both runoff and quality prediction techniques may be improved through use of additional data. Since a large amount of data presently exists, it needs to be aggregated to enable comparative analyses to be performed. In this manner, useful statistical and regression relationships can be developed incorporating several demographic and hydrologic parameters, and regional variations may be more easily discerned. Data collected as part of current USEPA 208 studies should be incorporated. In addition, studies are needed in which both surface (e.g., "dust and dirt") and effluent (e.g., concentration) data are gathered simultaneously so that their relationship may be determined.

Future reports containing data should be careful to define precisely the quality parameters being used along with the averaging method employed. Flow-weighted average concentrations are more meaningful than arithmetic averages. Since demographic data are obtainable through census publications, such data, especially population density and precise land use information, should be reported for each area on which sampling is being conducted.

COST ASSESSMENT METHODOLOGY

The general methodology appears to work well. It needs to be extended to cover a wider range of situations. More sensitivity analysis is needed.

The cost and performance data on storage and treatment units need to be refined.

The methodology should be extended to account for the interrelationship between storage and treatment especially at higher levels of control where detention times in storage are significant. Associated with this effort could be a study of the impact of different reservoir operating policies. A constant release rate is assumed at present.

The isoquant equations should be refined to account for snowmelt. An updated relationship between annual overflow events and percent runoff control should be included.

Further sensitivity analysis of the cost allocation formulation needs to be made to derive generalized curves for various combinations of influent treatment plant flow equalization and storage capacities.

The tradeoff with tertiary treatment should be evaluated using other pollutants such as nutrients as the effectiveness criterion.

IMPACT OF URBAN WATER POLLUTION CONTROL ON RECEIVING WATER QUALITY

In order to have basic information on the behavior of receiving waters when subjected to pollutant stresses beyond their natural assimilative capacity, continuous hydrologic models coupled with pollutant transport routines must be applied. It was found throughout this study that large amounts of data were available; however, these data were somewhat less than adequate for modeling purposes. In the area of data requirements some specific recommendations are:

1. The water quality indicators that will be used for planning purposes should be clearly identified before actual data collection.

2. The data collection system should be designed to be representative of the receiving water being investigated. Flow velocities, diffusion and dispersion coefficients, tidal cycles, etc., affect the frequency of sampling.

3. Sampling of receiving waters should be conducted <u>before</u>, <u>during</u>, and <u>after</u> periods of urban runoff.

4. The laboratory procedures utilized should be clearly described, for example, whether natural or artificial (deionized) dilution water was used in performing the standard BOD_5 test and the particle size and settling velocity definition of suspended solids.

5. Kinetic reactions of biochemical tests (i.e., deoxygenation rates of BOD) should be reported and compared with other locally obtained values.

6. Additional data on photosynthesis, algal respiration, and benthic demand of water bodies are needed.

7. Measurements of the nitrogenous oxygen demand of waste inputs and the receiving water are needed, as they are becoming more significant since greater numbers of secondary treatment plants are operational.

8. Both mass loadings and concentrations of pollutants should be estimated and reported.

In the realm of modeling efforts, further work is required:

1. The response of receiving waters to urban runoff and dry-weather flow inputs should be characterized when storage of waste streams is considered in combination with treatment.

2. Simplified techniques to approximate the complex mechanisms of pollutant transport in lakes, bays, and estuaries should be developed.